Midterm 2 / 2015.11.24 / MAT 4233.001 / Modern Abstract Algebra

Name: ____

Please show all work and justify your answers.

1. Let τ be the permutation $(1,4,5)(1,3,5,2)$. Factor τ^{2015} into disjoint cycles.
2. Exhibit two nontrivial proper subgroups of the symmetric group Σ_3, one that is normal in Σ_3 and one not. Prove your assertions.
3. Suppose $\varphi\colon \mathbf{Z}_{14} \to \mathbf{Z}_2 \oplus \mathbf{Z}_7$ is a homomorphism and $\varphi(3) = [1,5]$. Find $\varphi(1)$.
4. Let $X = \{0,1\}$. Let R be the ring of real valued functions on X with the usual pointwise operations. Prove that $\{f \in R\colon f(0) = 0\}$ is a maximal ideal of R.
5. Suppose R is an integral domain. Show that $x, y \in R$ are associates, if and only if, they generate the same ideal in R.

1	2	3	4	5	total (50)